



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/721,249	11/22/2000	Ravi Srinivasan	AIRI.P0104USA	3237

7590 11/17/2003

Mark D. Saralino
Renner, Otto, Boisselle & Sklar LLP
19th Floor
1621 Euclid Avenue
Cleveland, OH 44115

EXAMINER

FETZNER, TIFFANY A

ART UNIT	PAPER NUMBER
----------	--------------

2859

DATE MAILED: 11/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/721,249

Applicant(s)

SRINIVASAN, RAVI

Examiner

Tiffany A Fetzner

Art Unit

2859

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-42 is/are pending in the application.
- 4a) Of the above claim(s) 20-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-19 and 42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 2-42 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED 1st RCE ACTION

1. **Claim 1 is canceled** as per applicant's August 11th 2003 amendment response to the office action of October 8th 2002, received on September 17th 2003.

RCE Request granted after final, abandonment and a petition to revive

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection, the request was initially improper which resulted in an abandonment status, however applicant's petition to revive has now been granted therefore, the case is no longer abandoned, and is now an RCE status application. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/12/2003 has been entered.

Inventive entity / priority concern

3. The examiner notes that although the inventive entity of the instant application and the U.S. Patent No. 6,150,816 is the same, there is a lack of pendency between the instant application and issued patent 6,150,816 of 1 day. U.S. Patent No. 6,150,816 issued Tuesday November 21st 2000, was filed February 24th 1998 and claims priority to US provisional application 60/039,152 dated February 25th 1997. The instant application was filed Wednesday November 22nd 2000. Additionally, the examiner notes that US provisional application 60/039,152 dated February 25th 1997; is also the priority document to the **Srinivasan** PCT publication WO 98/37438 published August 27th 1998; which is a 102 (b) reference against the claims of the instant application.

Specification

4. The disclosure is objected to because of the following informalities: On page 3 line 7 after "c1" insert "tuning" before "capacitors so there is proper antecedent basis for "tuning capacitors C1 mentioned subsequently be applicant's disclosure. In US patents all adjectives being used to describe a component must be present the first time a component is introduced, to establish proper antecedent basis. Appropriate correction is required.

Drawings

5. **Figures 1a, 2a, 3a and 4a** should be designated by a legend such as **--Prior Art--** because they are taught in applicant's specification to be coil configurations of prior patent references. Corrected drawings are required in reply to the Office action to avoid abandonment of the application.

6. **Figure 9** should be designated by a legend such as **--Prior Art--** because only that which is old is illustrated. See MPEP § 608.02(g). Figure 9 is Figure 14 of US patent 6,150,816. Corrected drawings are required in reply to the Office action to avoid abandonment of the application.

7. New corrected drawings are required in this application because all of the figures in the instant application are informal, and formal drawings are needed for publication. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Election/Restrictions

8. This application contains claims directed to the following patentably distinct species of the claimed invention: An integrated radio frequency coil array, comprised of three coils, a central ring, and a virtual ground. (i.e. claims 2-19, 42) and a second species which depends from **claim 20**, of claims **20-41** which requires that each of the three coil structures of generic **claim 2**, be birdcage coil structures with a relationship to a central ring. **Claim 2** is considered to be a generic claim, but since the structure of **claims 2-19**, and **42** do not require the structure of claims 20-41; the examiner considers claims 20-41 to be a separate distinct species. Species 2 therefore includes **claim 2** the generic claim and **claims 20-41**.

9. Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, **claim 2**, (i.e. applicant's new and only independent claim is considered to be generic by the examiner.

10. Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

11. Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims

are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

12. Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

13. During a telephone conversation with attorney **Mark D. Saralino** Reg. No. 34,243 on **November 12th 2003** a provisional election was made without traverse to prosecute the invention of **Species number 1, claims 2-19, and 42**. Affirmation of this election must be made by applicant in replying to this Office action. **Claims 20-41 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.**

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. **Claims 2-19, 42** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Srinivasan** US patent 5,777,474 issued July 7th 1998.

16. With respect to **New claim 2**, **Srinivasan** shows "An integrated radio-frequency coil array", [See Figure 6] "comprising: a first coil;" (i.e. ring 42 c shown in Figure 6) "a second coil located relative to the first coil;" (i.e. one of the four rectangular coils which diametrically, make up quadrature coil 40c, because in Figure 6 four diametrically rectangular coil segments quadrature coil 40c) "and a third coil located relative to the first coil and the second coil", (i.e. a second different one of the four rectangular coils which diametrically, make up quadrature coil 40c, because in Figure 6 four diametrically separate rectangular coil segments comprise the quadrature coil structure identified as component 40c) "wherein the second coil and the third coil are situated such that the second coil and the third coil are electrically connected at a central ring", [See Figure 6 where any arbitrary two of the four diametrically rectangular coil segments of quadrature coil 40c, are electrically connected to circular ring 42c at the points on central coil ring 42c which appear to be full black circles, or large solid black dots. Additionally, **Srinivasan** shows that "the central ring" (i.e. 42c) "falls over a central virtual ground plane of the first coil." [See the plane defined between points VG1 and VG2, the virtual ground 1 and virtual ground 2 points, as well as the ground point shown in Figure 6] The examiner also notes col. 5 lines 1-5.

17. With respect to **New claim 3**, **Srinivasan** shows the second coil and the third coil are substantially isolated from one another and from the first coil." [See figure 6, where the second coil is broadly interpreted by the examiner as the rectangular, diametrical coil spanning the horizontal axis, and the third coil is broadly interpreted by the examiner as the rectangular, diametrical coil spanning the vertical axis]. The examiner

notes that when two RF coils are at 90 degrees or orthogonal to one another, as shown by the horizontal and vertical rectangular coil segments of the quadrature coil 40c in Figure 6 the signals are intrinsically decoupled or isolated from one another, (i.e. the signal components from one rectangular coil segment are shielded from the signal components of the other orthogonally positioned coil, such that the diametrically horizontal rectangular coil segment, does not see the diametrically vertical rectangular coil segment, when the coil is electrically conducting an RF frequency/current).

Therefore Figure 6 shows at least two coil configurations (i.e. the vertical / horizontal rectangular coil segments; and the two rectangular coil segments located in the 45/225 and 135/315 degree planes) which are “substantially isolated from one another”) based upon the geometry of the structure shown in Figure 6. Additionally because the nodal points of contact of the “second” and “third” coils are located orthogonal to one another on circular ring 42c, and the point of mutual overlap for the circular ring and either of the two diametrically, rectangular orthogonal coil component pairs occurs at VG1, (i.e. virtual ground 1) **Srinivasan** also shows that “the second coil and the third coil are substantially isolated from one another and from the first coil.” [See Figure 6]. The same reasons for rejection, that apply to **claim 2**, also apply to **claim 3**.

18. With respect to **New claim 4**, **Srinivasan** shows the first coil has an imaging field of view (FOV)” [See col. 3 lines 19-45; col. 5 lines 41-65 where the FOV for both the circular coils and the quadrature coil are taught.] The examiner notes that from the geometrical configuration of figure 6 shown that “the first coil” (i.e. component 42c) “has an imaging field of view (FOV)” which is circular, because the coil itself is circular , while

the two diametrically rectangular coils which make up quadrature coil 40c in the vertical and horizontal directions, also shown in figure 6, (i.e. "the second coil and the third coil") must via the geometry shown in figure 6 necessarily "combine to span a near identical B field to that of the first coil over the imaging FOV", because two diametrically orthogonal rectangular fields of view which pass through the center point of circular coil 42c, and define a cylindrical structure with a circular cross section, as shown in Figure 6, automatically "combine to span a near identical B field to that of the first coil over the imaging FOV", due to its physical geometrical structural relationship when energized by a radio frequency electromagnetic current. [See also col. 6 lines 21-42] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 4**.

19. With respect to **New claim 5**, **Srinivasan** directly shows and suggests from the coil configuration of figure 3 that "the second coil and the third coil are a subset of the first coil" [See figure 6]. The same reasons for rejection, that apply to **claim 2**, also apply to **claim 5**.

20. With respect to **New claim 6**, **Srinivasan** directly shows from figure 6 that "the second coil and the third coil have substantially the same dimensions", because each of the four diametrically rectangular coil components of quadrature coil 40c are shown to have substantially the same dimensions. [See Figure 6] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 6**.

21. With respect to **New claim 7**, **Srinivasan** directly shows from figure 6 that "the second coil and the third coil share a common coil path" because each of the four diametrically rectangular coil components of quadrature coil 40c, "share a common coil

path" through virtual ground 1 and virtual ground 2 as shown in Figure 6. The same reasons for rejection, that apply to **claim 2**, also apply to **claim 7**.

22. With respect to **New claim 8**, **Srinivasan** directly shows from figure 6 that "the coil path includes reactive elements" because capacitors c11 and c8 constitute reactive elements. [See Figure 6]. The same reasons for rejection, that apply to **claims 2, 7**, also apply to **claim 8**.

23. With respect to **New claim 9**, **Srinivasan** directly teaches that "the reactive elements" (i.e. the capacitors of Figure 6) "are chosen to cancel the coupling between the second coil and the third coil. [See col. 9 line 33 through col. 10 line 37] The same reasons for rejection, that apply to **claims 2, 7, 8**, also apply to **claim 9**.

24. With respect to **New claim 10**, **Srinivasan** directly implies and shows from the geometry of the coils shown in figure 6 that "the FOV of the second coil" (i.e. the rectangular FOV defined by the diametrically rectangular vertical coil that makes up quadrature coil 40c), "and the FOV of the third coil" (i.e. the rectangular FOV defined by the diametrically rectangular horizontal coil that makes up quadrature coil 40c), "are within an FOV of the first coil" (i.e. the circular field of view defined by coil 42c) [See Figure 6]. The same reasons for rejection, that apply to **claim 2**, also apply to **claim 10**.

25. With respect to **New claim 11**, **Srinivasan** directly shows that "the second coil and the third coil" (i.e. the orthogonal diametrically rectangular horizontal and vertical coils that make up quadrature coil 40c), "are situated symmetrically within the first coil." (i.e. coil 42c) [See figure 6]. The same reasons for rejection, that apply to **claim 2**, also apply to **claim 11**.

26. With respect to **New claim 12, Srinivasan** directly teaches that “the first coil, the second coil and the third coil image simultaneously, independent of each other.” [See col. 4 lines 13-58; especially lines 36-41, where multiple various configurations including the use of multiple coils, independently or jointly together are taught. The examiner also notes that simultaneous operation is also taught in col. 6 lines 43-54 which expands on the teachings of figure 6 taught in col. 6 lines 21-42.] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 12**.

27. With respect to **New claim 13, Srinivasan** directly teaches that “the first coil and a combination of the second coil and the third coil image simultaneously.” [See col. 4 lines 13-58; especially lines 36-41, where multiple various configurations including the use of multiple coils, independently or jointly together are taught. The examiner also notes that simultaneous operation is also taught in col. 6 lines 43-54 which expands on the teachings of figure 6 taught in col. 6 lines 21-42.] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 13**.

28. With respect to **New claim 14, Srinivasan** directly teaches that “the second coil and the third coil image simultaneously.” [See col. 4 lines 13-58; especially lines 36-41, where multiple various configurations including the use of multiple coils, independently or jointly together are taught. The examiner also notes that simultaneous operation is also taught in col. 6 lines 43-54 which expands on the teachings of figure 6 taught in col. 6 lines 21-42.] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 14**.

29. With respect to **New claim 15**, **Srinivasan** directly teaches that “each coil image individually.” [See col. 4 lines 13-58; especially lines 36-41, where multiple various configurations including the use of multiple coils, independently or jointly together are taught. The examiner also notes that simultaneous operation is also taught in col. 6 lines 43-54 which expands on the teachings of figure 6 taught in col. 6 lines 21-42.] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 15**.

30. With respect to **New claim 16**, **Srinivasan** directly shows that coil array design is selected from the group consisting of a birdcage, a solenoid, an Alderman-Grant resonator, a transverse electromagnetic wave (TEM) resonator, a saddle, a counter rotating coil CRC pair, a Helmholtz pair, a surface loop coil, and a surface coil.” [See Figures 6, 4a, 5, 8a , 8b, and 9; col. 14 lines 21-32] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 16**.

31. With respect to **New claim 17**, **Srinivasan** teaches that “the first coil, the second coil and the third coil are configured from the group consisting of a high-pass configuration, a low-pass configuration, a band-pass configuration and a band-stop configuration.” [See col. 5 lines 53-65; col. 14 lines 33-43; where certain frequencies are passed or blocked depending upon the resonant frequency being used.] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 17**.

32. With respect to **New claim 18**, **Srinivasan** lacks directly stating that “the first coil, the second coil and the third coil” shown in Figure 6 “are volume type coils” however, Figure 9 shows a volume birdcage coil, and figure 8b depicts the virtual ground plane of the quadrature birdcage volume coil. The structure of figures 8b, 9, and 10a through

10c; in view of the configuration of figure 6 directly suggests that a volume configuration which meets the requirements of claim 2, is within the figures and teachings of **Srinivasan** because **Srinivasan** teaches surface volume coil configurations either individually, or taken together. Therefore, the teachings of the **Srinivasan** reference, in combination with the teachings shown do suggest that applicant's "first coil, second coil and third coil" may in fact be "volume type coils". [See the structure of figures 8b, 9, and 10a through 10c; in view of the configuration of figure 6; col. 9 line 33 through col. 12 line 49; col. 6 lines 21-33; col. 3 lines 50-64; col. 4 lines 14-22] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 18**.

33. With respect to **New claim 19**, **Srinivasan** teaches that "the first coil, the second coil and the third coil are surface type coils" because figure 6 is a quadrature surface coil. Therefore each of the component coils are also surface coils. [See col. 6 lines 21-33; col. 3 lines 50-64; col. 4 lines 14-22; col. 9 line 33 through col. 10 line 51] The same reasons for rejection, that apply to **claim 2**, also apply to **claim 19**.

34. With respect to **New claim 42**, **Srinivasan** teaches and shows "a coil array as described in **claim 2**;" [See the rejection of claim 2 which need not be reiterated] "and a means for processing RF signals which are at least one of received from the coil array and transmitted from the coil array in order to obtain a resonance image/analysis." [See col. 9 line 33 through col. 10 line 51; where the signals are controlled, decoupled (i.e. processed) during the magnetic resonance image/analysis for each of the frequency modes.] the same reasons for rejection, that apply to **claim 2** also apply to **claim 42**.

Art Unit: 2859

35. With respect to **claims 20-41** these claims are withdraw from consideration as being drawn to a non-elected invention.

36. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A) Srinivasan et al., US patent 5,602,479 issued February 11th 1997 [See figures 10, 11, 6, 7, 1 and 2]

B) Murphy-Boesch et al., US patent 5,194,811 issued March 16th 1993 [See Figure 2b, 4a, 8a]

C) Srinivasan US patent 6,177,797 B1 issued January 23rd 2001 with an effective date of December 19th 1996.

D) Srinivasan US patent 5,999,000 issued December 7th 1999 with an effective date of November 8th 1996.

E) Wong US patent 6,285,189 B1 issued September 4th 2001 filed September 4th 1999. [See figures 3c 4a, 4b, 4c2b, 2d, 2e, 1]

F) Hayes US patent 4,694,255 issued September 15th 1987. [See figure 10, 2b, 12].

Conclusion

37. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is (703) 305-0430. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

38. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached on (703) 308-3875. The fax phone number for the organization where this application or proceeding is assigned is (703)305-3432 .

39. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0956.



TAF

November 13, 2003



Diego Gutierrez

Supervisory Patent Examiner

Technology Center 2800